# Laser Ignition for Advanced Gasoline Engines

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Small Business Information
Princeton Optronics
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Hubzone Owned:
N

Socially and Economically Disadvantaged:
N
Woman Owned:
N

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Abstract
A new ignition concept is needed for lean-burn combustion in gasoline engines. The approach should extend the lean ignition limit air/fuel ratio to & gt; 20, to enable reliable ignition under high in-cylinder pressures (up to 100 bar at the time of ignition) thus enabling high load operation, operation under high levels of exhaust gas recirculation, and lower or maintain ignitability (coefficient of variance of IMEP & lt; 3%). The objectives of phase I would be to develop a laser igniter for advanced automobile engines. Our goal would be to first define the specifications of the laser igniter to be developed. We would then design and build a laser igniter in and test it very thoroughly at Argonne National Laboratory. The major objectives of testing will be determining optimal laser pulse energy, number of pulses required per combustion cycle, time spacing between pulses, thermal load in the spark plug well, and other such parameters through single-cylinder engine tests. In phase II, we would develop a more advanced laser igniter and test it thoroughly for all the relevant parameters. In phase I, we would first define the specifications of the laser igniter to be developed in phase II of the program. We would then design the laser igniter to be developed in phase I and order the of the optical, mechanical and thermal components. Next we would do the optical bench test and verification of the solid state laser design and build the the laser ignition module. We would then test the laser igniter in a single-cylinder engine at Argonne National Lab. Finally, we would do the design for the improved laser igniters to be built in phase II. Commercial Applications and Other Benefits: The laser igniters would have near term high volume applications in automobile engines. In addition to automobile engines, it will have applications in natural gas power generation engines and other types of power generation engines such as those using biogas. In future it will have applications for natural gas truck engines and aerospace engines.

* information listed above is at the time of submission.